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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Estimation of soil erosion considering soil loss tolerance in karst area" *by* Yue Cao et al.

Yue Cao et al.

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Dear reviewer: I am very grateful to your comments for the manuscript. According with your advice, we amended the relevant part in manuscript. Some of your questions were answered below. OVERALL COMMENTS: 1. In chapter 4.2, we compared the results of soil allowable loss with other studies, and proved the reasonable of the calculation of the allowable loss of soil. In addition, we also compared the soil erosion modulus corrected by the soil loss tolerance with other field or experimental data in Table 5, which proved the necessity and correctness of the correction.

2. Thank you for your comments. We have rewritten the introduction, adding a review about the concepts of soil tolerance. We have sorted out the key problems that need

to be addressed in this paper, and detailed the necessity and significance of studying the soil loss tolerance in the karst area. We increased research progress on the loss tolerance of soil, and compared the results of this paper with the current allowable loss of soil in karst areas in the chapter 4.2 of the article. The added references follows: [1] Nearing, M. A., Xie, Y., Liu, B., and Ye, Y.: Natural and anthropogenic rates of soil erosion, International Soil & Water Conservation Research, 5, 2017. [2] Mccormack, D. E., Young, K. K., and Kimberlin, L. W.: Current Criteria for Determining Soil Loss Tolerance, ASA Special Publication - American Society of Agronomy (USA), asaspecialpubli, 1982. [3] Lan, L., Du, S., Wu, L., and Liu, G.: An overview of soil loss tolerance, Catena, 78, 93-99, 2009. [4] Chai, Z.: Soil Erosion in Karst Area of Guangxi Autonomous Region, Journal of Mountain Research, 1989. 255-260, 1989. [5]Chen, X.: Research on Characteristics of Soil Erosion in Karst Mountainous Region Environment, Journal of Soil Water Conservation, 1997 [6] Wei, Q.: Soil Erosion in Karst Region of South China and its Control, Research of Soil & Water Conservation, 1996. [7] Li Y , Bai X Y , Wang S J , et al. Evaluating of the spatial heterogeneity of soil loss tolerance and its effects on erosion risk in the carbonate areas of southern China[J]. Solid Earth, 2017, 8(3):661-669. [8] Qian, Q., Wang, S. J., Bai, X., Zhou, D., Tian, Y., Li, Q., Wu, L., Xiao, J., Zeng, C., and Fei, C.: Assessment of soil erosion in karst critical zone based on soil loss tolerance and source-sink theory of positive and negative terrains, Acta Geographica Sinica, 73, 2135-2149, 2018.

3. In chapter 2.3.1,we specified that the RUSLE was used to evaluate the soil erosion in the study area, and only splash, sheet and interill/rill water erosion is considered (Liu et al., 2018)

DETAILED COMMENTS: 4. Abstract: We improve it as "Here we utilized the thermodynamic dissolution model of carbonate rocks to calculate the dissolution velocity of carbonate rocks, which was combined with the content of acid-insoluble components and the lithological characteristics to estimate the soil loss tolerance, which was then used to revise and evaluate the soil erosion in karst area."

5. Introduction: Thanks for your suggestion; we have added this section about a review about the concepts of soil tolerance to the introduction section

6. M&M: Thanks for your suggestion; LS is the topographic factor, we have grouped.

7. M&M: Thank you for your careful work. We have checked and revised the units in Eq.1.

8. Thanks for your suggestion. We have rewrite the sentence.

9. Thank you for your careful work. We have amended the units of R factor.

10. In chapter 4.1 , we specified the reason of double thresholds of rainfall erosivity in karst. Runoff does not generate in every rainfall in karst area, but mainly in heavy rain (25mm-50mm), specially rainstorm (exceeding 50mm). Because fissures are well developed in karst areas (Fig.2), most of the rainfall enters underground rivers through fissures, making the surface runoff coefficient of karst areas very low, which runoff coefficient was about 2.31%-14.72% (Wei et al., 2011). Non-karst areas generally exceed 20%, and even more than 30% (Shi et al., 2005). In view of the above, erosive rainfall threshold for the karst area is 30mm.

11. Thank you for your careful work. We have amended the units of K factor.

12. This paper refers to the previous research results and combines the local land use and agricultural activities to determine the P value (Xu et al., 2011), assigns the P factor value to the corresponding land use (Table 2), and obtains the P factor map of the study area. The obtained value is within 0–1. If the value is 0, then the area is not affected by soil erosion; if the value is 1, the area has not been subjected to any soil or water conservation measures. For the study area, paddy fields have basically been terraced, but a considerable part of the dry land has not taken any measures.

13. Thank you for your careful work. We have corrected the tense.

14. Thank you for your careful work. We have corrected the tense.

15. Equation 11 gives the formula for soil loss tolerance for different rock types in karst areas, in which the formula for calculating the maximum dissolution velocity of carbonate rocks is given in Equation 13; then the factors in Equation 13 are given in Equation 14-22.

16. In chapter4.2, we compared our result with others studies of soil loss tolerance in karst area, and proved the correctness of the calculation of the allowable loss of soil. Furthermore, we also compared the soil erosion modulus corrected by the soil loss tolerance with other field or experimental data in Table 5, which proved the necessity and reasonable of the correction.

Thank you for the kind advice. Sincerely yours, Yue Cao Corresponding author: Name: Xiaoyong Bai E-mail: baixiaoyong@126.com

Please also note the supplement to this comment:
https://www.nat-hazards-earth-syst-sci-discuss.net/nhess-2018-310/nhess-2018-310-AC1-supplement.pdf

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